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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,114	02/21/2002	Kanwarpal S. Dhugga	1301	1712

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PIONEER HI-BRED INTERNATIONAL, INC.
7250 N.W. 62ND AVENUE
P.O. BOX 552
JOHNSTON, IA 50131-0552

EXAMINER

IBRAHIM, MEDINA AHMED

ART UNIT PAPER NUMBER

1638

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/080,114	Applicant(s) DHUGGA ET AL.	
	Examiner Medina A. Ibrahim	Art Unit 1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13,14,16-18,20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-14, 16-18 and 20-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant's response filed 09/30/05 in reply to the Office action of 01/28/05 has been entered. Claims 1, 2, 8, 11, 13 and 17 have been amended. Claims 15 and 19 have been cancelled. Therefore, claims 1-11, 13-14, 16-18, and 20-21 are pending and are examined.

All previous objections and rejections not set forth below have been withdrawn in view of Applicant's amendment to the claims.

Claim Rejections - 35 USC § 112

Claims 13-14, 16-18 and 20-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 17 are indefinite for reciting an improper Markush group of sucrose synthase polynucleotides. The polynucleotides of claim 1 are recited as SEQ ID NO: while Sus1 from maize and Sh1 from maize are not recited as SEQ ID NO: Dependent claims 14, 16, 18, and 20-21 do not obviate the rejection, therefore, are included in the rejection.

Claim Rejections - 35 USC § 112

Claims 1-11, 13-14, 16-18, and 20-21 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the isolated

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polynucleotide of SEQ ID NO: 1 or 11, a recombinant expression cassette comprising said polynucleotide, host cells, and transgenic plants/seed comprising said polynucleotide and methods of transforming a plant with said polynucleotide, does not reasonably provide enablement for isolated polynucleotides from any source having at least 95% sequence identity to SEQ ID NO: 1 or 11 and encoding a polypeptide with sucrose synthase activity, and polynucleotides encoding polypeptides having at least 80% sequence identity to SEQ ID NO: 2 or 12 and retaining sucrose synthase activity. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. This rejection is repeated for the reasons set forth in the Office action of 01/28/05. Applicant's arguments filed in 09/30/05 have been considered but are not deemed persuasive.

Applicant asserts that claims 1-2, 8, 11, 13, and 17 have been amended to obviate the rejection set forth in the Office action. However, amended claims recite isolated polynucleotides from any source having at least 95% sequence identity to SEQ ID NO: 1 or 11 and encoding a polypeptide with sucrose synthase activity, and polynucleotides encoding polypeptides having at least 80% sequence identity to SEQ ID NO: 2 or 12 and retaining sucrose synthase activity. The instant specification has not provided guidance for any modifications to SEQ ID NO: 1-2 or 11-12 that resulted in the production of polynucleotides having both the structural and functional properties as recited in the claims or methods for increasing cellulose production using any of said polynucleotides.

The state of the art teaches that sucrose synthases catalyze the reversible conversion of sucrose and UDP into UDP-glucose and fructose. The state of the art also teaches that enzymes differ in their expression patterns and tissue localization. While several Susy encoding polynucleotides have been isolated from various plants, the mechanisms for regulation of the enzymatic activity in transgenic plants are not well understood (Huber et al. Plant Physiology (1996) 112:793-802). In addition, a number of enzymes including Susy are known to be involved in the cellulose biosynthetic pathway, and it is not clear to what extent the control of only one of these enzymes would be successful in controlling cellulose biosynthesis.

The instant specification fails to provide guidance with respect to the ability of a sucrose synthase encoding polynucleotide to alter cellulose concentration in specific plant tissues. The instant specification does not provide sufficient working procedure that one skilled in the art may practice the invention as broadly claimed without undue experimentation.

Therefore, given the breadth of the claims; the limited guidance provided the specification; the lack of working examples; and the state of the art; and the unpredictability inherent in regulating enzymatic activity in a transgenic plant as discussed in the last Office action, the claimed invention is not enabled throughout the broad scope. Therefore, the rejection is maintained.

Claim Rejections - 35 USC § 103

Claims 13-14, 16-18, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barry et al (US 5,716,837), in view of Fu et al (The Plant Cell, Vol. 7, pp. 1369-1385, 1995). This rejection is repeated for the reasons of record as set forth in the last Office action of 1/28/05. Applicant's arguments filed in 09/30/05 have been considered but are not deemed persuasive.

Applicant argues that Barry et al teach transformation of horticultural and crop plants with sucrose phosphorylase, and does not teach or suggest the claimed polynucleotides. Applicant also argues that Fu et al teach away from using sucrose synthase genes for altering cellulose in plants because it relates the function of sucrose synthase genes with supplying energy for respiration (response, pp.11-12).

These are not persuasive. Barry et al need not teach the claimed polynucleotides since the rejection is one of obviousness and not one of anticipation. Barry et al was relied upon because it provides transformation of a plant with a heterologous DNA encoding a starch synthesis polypeptide for increased level of starch in specific tissues including root, seed and fruit of the plant. The cited reference further teaches use of organ-specific tissues in the transformation construct, and transformation and regeneration of specific plant species including those listed in claims 14 and 18. The cited reference suggests that genes encoding other enzymes involved in starch synthesis can also be used for plant transformation (see the whole document).

Fu et al reference was relied upon because it provides that genes encoding sucrose synthase from plants including Sus1 of maize are known and suggest

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transformation of plants with said genes. Applicant's own specification admits that Sh1 and Sus1 of maize are known (paragraph bridging pages 2-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the application was filed to use the method of transforming a plant with a DNA encoding a sucrose biosynthetic enzyme for increased level of sucrose or starch as taught by Barry et al, and to modify that method by incorporating any one of the known sucrose biosynthesis enzyme encoding DNA including sucrose synthase genes known in the prior art as taught by Fu et al, with a reasonable expectation of success. One would have been motivated to use a sucrose synthase gene because of the availability of sucrose synthase genes from plants including maize and the importance of the genes in altering sucrose and starch biosynthesis as suggested Fu et al. One of ordinary skill in the art can readily transform a plant including those listed in claims 14 and 18 with any one of the functionally known sucrose synthase genes with an appropriate promoter; and given that Sus1, sh1 of maize and promoters for pericarp or seed-specific expression are known in the prior art as evidenced by both Barry et al and Fu et al, without any unexpected results.

Therefore, the claimed invention as whole was *a prima facie* obvious. See *In re Lindner*, 173 USPQ 356 (CCPA 1972) and *In re Grasselli*, 218 USPQ 769 (Fed. Cir. 1983), which teach that the evidence of unexpected results should be commensurate with the scope of the claims. In this case, Applicants' unexpected result, namely, the isolated DNA encoding SEQ ID NO: 2 or 12, transgenic plant comprising it, and a method of using said polynucleotide are not commensurate with any polynucleotide encoding sucrose synthase or methods of its use.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6, 472, 588 (Haigler et al, filed September 1999).

Remarks

The polynucleotide sequences of SEQ ID NO: 1 and 11 and polynucleotides encoding SEQ ID NO: 2 or 12 are free of the prior art, as stated in the last Office action.

No claim is allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (571) 272-0797. The Examiner can normally be reached Monday -Thursday from 8:00AM to 5:30PM and every other Friday from 9:00AM to 5:00 PM. Before and after final responses should be directed to fax nos. (703) 872-9306 and (703) 872-9307, respectively.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anne-Marie Grunberg, can be reached at (571) 272-0804.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

For all other customer support, please call the USPTO Call Center (UCC) at 800-786-9199.

12/27/05

Mai

MEDINA A. IBRAHIM
PATENT EXAMINER

Medina A. Ibrahim